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**INFORMETRICS ANALYSIS OF AHMADU BELLO UNIVERSITY, ZARIA
INSTITUTIONAL DIGITAL REPOSITORY (IDR)**

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Abstract

Employing Informetric analysis, the study investigated the features, types of documents, subjects spread and challenges affecting the growth and development of Ahmadu Bello University, Zaria Institutional Digital Repositories (ABU-IDR). The findings of the study indicated that the IDR has diverse features, deploying DSpace, Dublin core metadata elements and Open Archive Initiative – Metadata Harvesting Protocol (OAI-PMH) to make the repository robust and interoperable. As reported by earlier studies, ABU-IDR is also found to be dominated by theses and dissertations with 9,857(95.82) documents. Finding on subjects spread of theses and dissertations illustrated that Faculties of Sciences and Education have the largest subject coverage with 1979 (20.1%) and 1702 (17.3%) respectively. With diverse features and deploying DSpace, OAI-PMH and its interoperability, the study concluded that ABU-IDR has gained considerable traction in recent years. However, the IDR can be made more effective and efficient by creating institutional repository policy that will take care of copyright, deposition right, diversification of contents and advocacy which are the major challenges hampering the growth and development of the IDR.

Keywords: Institutional Digital Repositories (IDRs), Informetrics Analysis, Ahmadu Bello University, Zaria

1.0 Introduction

Institutional Digital Repositories (IDRs) are an institutional initiative that has proliferated academic libraries globally. The acceleration in the proliferation of institutional repositories in Europe, Asia, Australia, America and Africa can be traced back to the beginning of the 21st century. By 2005, the establishment of institutional repositories in 10 European countries ranged from the lowest 1.5% in Finland, Belgium, Denmark, France, Germany, Italy, Sweden and the United Kingdom to the highest 100% in Germany, the Netherlands and Norway (Abrizah, 2009). In 2006, Cullen and Chawner (2010) found that all Australian universities had institutional repositories. Also, there has been an increase in the number of institutional repositories in the United States, with 40% of all learning institutions having institutional repositories (Okumu, 2015). However, the development and adoption of institutional digital repositories in African countries in general and Nigeria, in particular, have been, according to Jain, Bentley & Oladiran, (2009) very sluggish. Although OpenDoar (2020) has indicated a significant change in the adoption of institutional digital repositories by African countries with South Africa leading with 44 of its universities adopting IDR, followed by Kenya and Nigeria with 41 and 30 universities respectfully, it can still be argued that these figures are grossly inadequate, especially taken into cognizance the number of universities in each country.

The term Institutional Repositories (IRs) also called Institutional Digital Repositories (IDRs) has been defined by Lynch (2003) as "a set of services that a university/institution offers to the member of its community for the management and dissemination of digital materials created by the institution and its community members. In another related definition and the simplest sense of the term, Institutional Repository is a digital archive of the scientific and scholarly output of an institution, stored in a digital format, where a search and recovery is permitted for its subsequent national or international use, (Alfa Network Babel Library, 2007). An Institutional Repositories (IRs) aim at collecting the intellectual output that exists at a particular institution and currently, more and more universities are developing archives to hold their faculty's publications to provide open access to these intellectual contents as a way of disseminating and showcasing intellectual assets (ACRL Study Planning 2015). Hence, Institutional Repositories provide a platform for effective and efficient transmission of scientific output that is essential to fostering and stimulating a vibrant intellectual atmosphere. Enumerating some importance of an IR to its parent institution Kumah, Adzadi and Imoro, (2019) maintain that IR is not only enhancing the institution's prestige/visibility, maintaining control over an institution's intellectual property, capturing and maintaining the intellectual assets of an institution but also encouraging open access.

Most academic institutions domicile Institutional Repositories in their academic libraries. The academic libraries are saddled with the responsibility of identifying, selecting and digitizing the institution's intellectual outputs from digital archive filled with the academic work and communications produced by the faculty, administration, and students of the institution. The digitized contents are uploaded and made available to researchers locally and globally electronically via the library website. Usually, a section or unit within the library is designated and lumbered with the responsibility of creating and managing contents of the IDR, as well as providing services. In this regards, Horwoodet, et al (2004) discussed several roles of librarians in building and maintenance of IR including the need to work with academic colleagues to provide online contents and access for research, learning and teaching, especially for institutions establishing and offering flexible online learning delivery

The need to move along with the current trends of making information resources easily available and accessible to clientele especially using the online system motivated the Ahmadu Bello University library to design, establish, deploy and manage its digital information resources of enduring value to students, lecturers, and researchers, (Muhammad

and Aliyu, 2014). According to Musa and Musa (2012) the digitization project in Kashim Ibrahim Library, the main library of Ahmadu Bello University, Zaria started with a set target of digitizing theses, dissertations, seminar papers and conference proceedings. The project started in July 2005, by digitizing only title pages and abstracts of theses and dissertation which were saved on CDs and managed on Database of African Thesis and Dissertation (DATAD) flat form. It is understandably clear that for those fifteen years since the commencement of Ahmadu Bello University, Zaria's Institutional Digital Repository (hereby refer to as ABU-IDR), the repository has not only accumulated a large amount of digital information but that it makes the quantity of research output emanating from the university quite high. The repository has no doubt generated a lot of interest from different scholars, for instance, in discussing the implementation and development of Institutional Digital Repository in Ahmadu Bello University Library Zaria, Mohammed and Aliyu (2014) discussed the equipment, facilities, software, the digitization process, test running, training, system installation and workflow developed for the repository. Similarly, Ahmad (2017) investigated the awareness and utilization of ABU-IDR by Postgraduate Students of the faculty of Science in which the study discovered that the Awareness of Institutional Digital Repository by Postgraduate Students of the faculty of Science Ahmadu Bello University Zaria was very low so also the utilization of the institutional digital repository.

It is clear from the above-mentioned studies that ABU-IDR has certainly come of age. It is also clear that most of the literature reviewed on the deployment of Institutional Digital Repository either in Ahmadu Bello University Zaria or other higher institutions in Nigeria and African have limited themselves to only issues of development, deployment, awareness, access and utilization, however, none has attempted to evaluate and measure the impact of the Institutional Digital Repository. Although this study is not an evaluation, nevertheless, employing informetrics analysis the study measures the contents of ABU-IDR. Of course, one of the major aims of Informetrics analysis is to measure as well as evaluate the impact factor of websites of institutions, institutional repositories and universities. Bjorneborn and Ingwersen (2004) noted that by using Informetrics indicators tools the visibility of the websites, the presence of rich files in the websites or repository can be analyzed to enhance the efficiency of the websites and repositories through optimizing web and repository contents. Hence, using informetrics analysis, the content of ABU-IDR from January 2009 and March 2020 was analyzed. The significance of this study lies in the fact that measuring the

repository will indicate the contents, types and number of documents, challenges and possible solutions. According to Zuber (2008) knowing the weaknesses in a system are required to address and strengthen the system.

2.0 Research Question

The following questions were raised to be answered by the study;

1. What are the features of Ahmadu Bello University, Zaria Institutional Digital Repository?
2. What are the types of documents in Ahmadu Bello University, Zaria Institutional Digital Repository by types?
3. What is the number of documents by type in the Ahmadu Bello University, Zaria Institutional Digital Repository?
4. What is the subject spread of Ahmadu Bello University, Zaria Institutional Digital Repository?
5. What are the challenges affecting the growth and development of Ahmadu Bello University, Zaria Institutional Digital Repository?

3.0 Literature Review

Kennan (2014) and Priyadarshani (2019) reveal that there are several studies, articles, papers and reports on IR. The origin and several aspects of IR are well explained by Richard Jones (2006). He attempted to expose the scope of an institutional repository in the digital library landscape, how and when the concept came into existence among the scholars. Ki Tat Lam (2007) and his team studied the repository of Hong Kong University of Science and Technology. He explained every stage of IR, from Planning of developing an IR to publicizing that IR to the global level. Similarly, Rashmi Rekha (2011) worked on Institutional repository of universities and research institution of India. Apart from finding out that 79 IRs of different universities and institutions were actively working and facilitating open access, her research reveals that DSpace and EPrints were dominating as the leading software for repository development in India. With regards to technical aspects of institutional repository development, specifically, the software and hardware used to run repositories, there is a surfeit of information, Rani (2011) notes that by the year 2000, several broad technological developments in the digital information system were also pushing individuals and their organization towards the creation of IR.

Discussing on the importance of IR, Ani and Ahiazu (2008) noted that the advent of electronic information services has significantly changed the information handling and

management in academic environments, expanding online information outlets such as search engines, web pages and digital libraries. Supporting this, Rani (2011) notes that Institutional repository is the marquee of an institution in the world, where institution displays its worthwhile research programmes, projects, and initiatives to the broad spectrum of an audience in the world. Similarly, Hoorens, van Dijk, and van Stolk (2008) note that digital archives would help educational institutions establish cohesive and organized strategies to collect, classify, store, and recover intellectual objects, such as databases, course materials, and research papers. Summarizing the importance of IR Jain, Bentley Oladiran (2009) remark that Institutional repositories are the benchmark of digital scholarship and have increasingly become the essential part of a university's scholarly dissemination in the age of digital publishing. Be as this may be, Kennan (2014) ascents that there is also opposition to IR and other forms of open access from commercial journal publishers who see that OA might harm their business and therefore their profits. Supporting this position, Goodman (2004) and Poynder (2004) reveal further opposition from some of the scientific societies for whom the sale of publications can form a significant part of income and subsidies their other activities. With regards to the contents of IR, Thomas (2007); Ezema and Ugwu (2013); Chilimo (2015) argue that Electronic Thesis and Dissertations (ETDs), pre-print/post print journal articles, seminar papers, conference proceedings, inaugural lectures among others continue to dominate the material on IRs in Africa. Supporting the above statement, Ratanya (2017) also noted that this pattern hasn't been any different in most countries worldwide.

4.0 Research Methods

The research paper employed quantitative research approach and using informetrics analysis, the contents of ABU-IDR were examined to determine the design features, types of documents, subject spread, etc. of the repository. The content analysis of the repository took the form of checking it, counting by tallies the number of documents by type, subject spread, etc. This was followed up with interviewing the staff, especially the head of the digitization unit to identify the challenges facing the development of the IDR in the University. The data collected was analyzed using descriptive statistics

5.0 Data Analysis

The data collected directly from the ABU-IDR were analyzed and discussed in line with the objectives set out for the study. The first objective of the research aimed at identifying the features of ABU-IDR. The features of IR represent the technical aspect of the

IR development, specifically the hardware and software used to run repositories and the interactions between repositories and other systems, processes and people, what Robertson (2008) called ecology. To identify these features, the technical components of the IDR were analyzed and the findings presented in table 5.1 below

Table 5.1: Available features in ABU-IDR

| S/N | Features of Institutional Digital Repository | Availability |
|------------|---|---------------------|
| 1 | Open Source Software (Dspace) | Yes |
| 2 | Dublin Core (DC), metadata compliant | Yes |
| 3 | Interoperability (OAI-PMH Compliant) | Yes |
| 4 | Open Access model (free access) | Yes |
| 5 | Linux operating System | Yes |
| 6 | Flexibility (Store varying file formats; PDF, words, etc.) | Yes |
| 7 | User restriction to deposit (requires user validation) | Yes |
| 8 | Open Architecture (Customizable capability) | Yes |
| 9 | Statistical reporting technique | Yes |
| 10 | Advance search option | Yes |
| 11 | Publishing Requirement for Industry Standard Metadata (PRISM) | Not |
| 12 | Shareable Courseware Object Reference Model (SCRORM) | Not |

Table 5.1 above indicates that ABU-IDR has diverse IR features; out of 12 features identified in the literature, the repository has 10 (83%). The repository is deployed on the best software; the DSpace which allows the capture of text, video, audio and data. As noted by Rani (2011), apart from allowing contents to be indexed and distributed over the web, DSpace has the advantage of managing contents professionally to give greater visibility and accessibility over time. The ABU-IDR also uses Dublin core metadata to describe fifteen elements of digital objects. Another important feature of IR found in ABU-IDR is its adoption of Open Archive Initiative – Metadata Harvesting Protocol (OAI-PMH) standard which permits the IDR to interact and share information with other platforms, what Gordon (2008) called interoperability. This means that the ABU-IDR efficiency and effectiveness in retrieval services is coherent and consistent with its metadata. Similarly, the repository operates Open Access Model, where information could be access free of charge. Additionally, a statistical reporting system is equally made available, as the repository generates user statistics base on the number of views including the location and major cities that visit the repository. The inclusion of advance search option is another important feature of this repository; the user can search using author, subject keyword, date of publication etc. The finding of this study is similar to Adewumi and Ikhu-Omoregbe (2010) who also found out that many features of an institutional repository in their study.

The second objective of the study investigated the types of documents in ABU-IDR. Although there is no consensus as to the types of documents an IR is supposed to contain, most literature recommended documents as listed in table 5.2 below:

Table 5.2: Types of documents in the ABU-IDR

| S/N | Types of Documents in ABU-IDR | Availability |
|------------|--|---------------------|
| 1 | Theses and Dissertations | Yes |
| 2 | Books | Yes |
| 3 | Conference Proceedings | Yes |
| 4 | Seminar Papers | Yes |
| 5 | Inaugural Lectures | Yes |
| 6 | Post-print Journal Articles | Yes |
| 7 | Preprint Journal Articles | Yes |
| 8 | Agricultural Research Collections | Yes |
| 9 | Central Bank of Nigeria Annual Report | Yes |
| 10 | School of Postgraduate Studies Collections | Yes |
| 11 | Teaching information resources | Not |
| 12 | Databases resulting from research projects | Not |
| 13 | Administrative including committee papers | Not |
| 14 | Computer Software work of art | Not |
| 15 | Photographs and audio-video recordings | Not |

Based on the result of the finding as presented in table 5.2, it is quite interesting to reveal that out of the fifteen documents mostly found in academic IR, ABU-IDR has 10 (67%). This finding is similar to Hanief (2014) discovery. While exploring and comparing various types of documents available in various IR in India, the study discovered that although every institute has their policy, almost every repository had almost all the documents listed in the above table. The absence of other important documents like the teaching information resources, photographs and audio-video recordings means that ABU-IDR is not very interactive. To make the IDR contain more local contents beyond intellectual documents, there is the need to include more documents on administration. Documents like the University Status, the guideline for Appointment and Promotion, some Council, Management, Senate and Committees papers need to be uploaded in the ABU-IDR so that university community and the general public can have unhindered access.

The third objective of the study seeks to find out the number of documents by types in the ABU-IDR because the content analysis is one of the most important criteria for institutional repository evaluation and the quality of an institutional repository mainly

depends upon the contents of an institutional repository. Employing content analysis, the documents were counted and analyzed as reported in table 5.3 below:

Table 5.3: Number of Documents by types in ABU-IDR

| S/N | Documents by Types in ABU-IDR | No. of Document by Types | % of No. of Document by Types |
|-----|--|--------------------------|-------------------------------|
| 1 | Theses and Dissertations | 9857 | 95.82 |
| 2 | Books | 20 | 0.19 |
| 3 | Conference Proceedings | 52 | 0.51 |
| 4 | Seminar Papers | 19 | 0.18 |
| 5 | Inaugural Lectures | 27 | 0.26 |
| 6 | Postprint Journal Articles | 207 | 2.01 |
| 7 | Preprint Journal Articles | 79 | 0.77 |
| 8 | Agricultural Research Collections | 1 | 0.01 |
| 9 | Central Bank of Nigeria Annual Report | 26 | 0.25 |
| 10 | School of Postgraduate Studies Collections | - | - |
| | Total | 10288 | 100.00 |

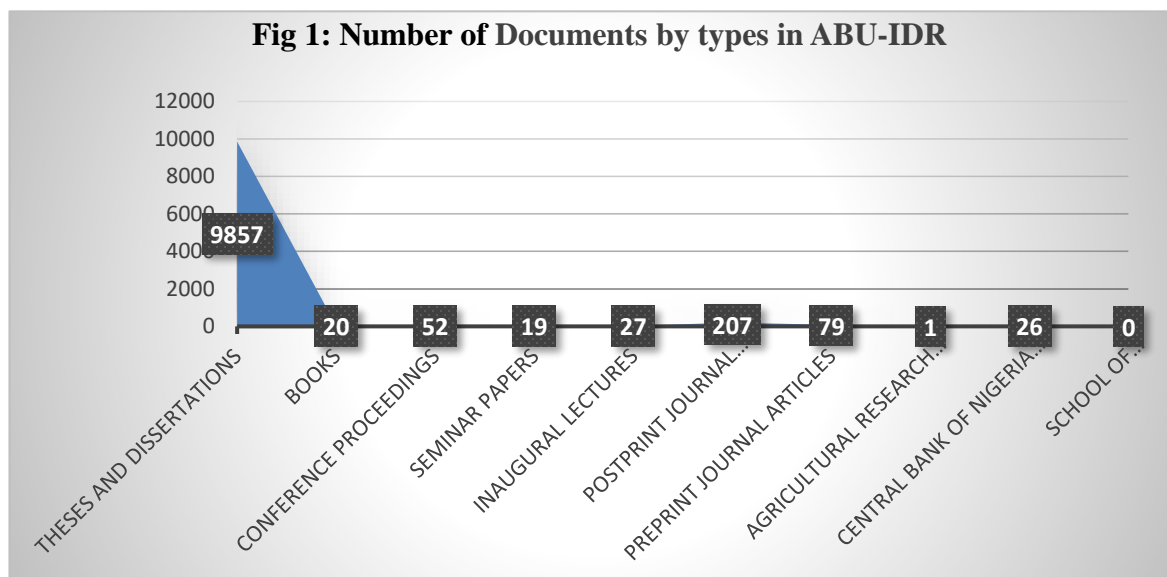


Table 5.3 and figure 1 above illustrate the myriad types of documents in the ABU-IDR where thesis and dissertation constitute the majority with 9,857 (95.82%) followed by post-print journal articles with 207 (2.01%). This finding collaborates Musa, Sahabi, and Dahiru, (2016) Adam (2019) who found in their various studies that the major types of information resources deposited on the repositories in Nigeria are; theses and dissertations, journal articles, seminar/conference paper and books. However, the fact that thesis and dissertation constitute the majority of the IDR confirmed earlier findings by Thomas (2007);

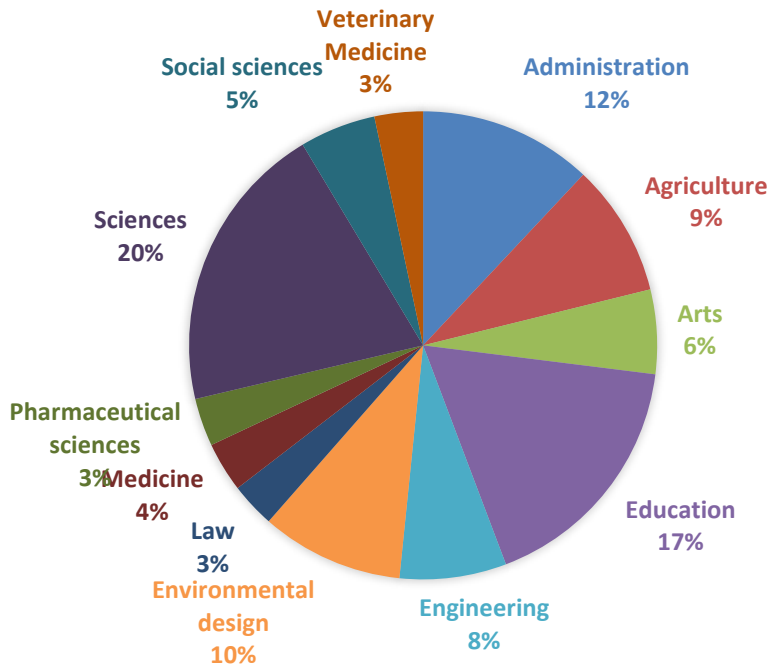
Ezema and Ugwu (2013); Chilimo (2015) in which they revealed that many countries in Africa including Nigeria have deployed Institutional Digital Repositories and the content on these IRs continue to be dominated by Electronic Theses and Dissertations. It is rather absurd that Agricultural research recorded the least documents. Ahmadu Bello University, Zaria is known for decades as the hub of agricultural research in the country because it has three agricultural institutes; Institute of Agricultural Research (IAR), National Animal Production Research Institute (NAPRI) and National Agricultural Research & Extension Liaison Services (NARELS). These institutes have no doubt generated indigenous researches that need to be shared globally via the IDR.

The fourth objective of the study analyzed the subjects spread in ABU-IDR. This analysis aim at showcasing those subjects that contributes most to the total collection of the IDR. Apart from limiting the subject analysis to only theses and dissertations documents, subjects spread is analyzed in this study within the concept of the twelve faculties in the University. Table 5.4 and figure 2 below show the findings

Table 5.4: Subjects spread in ABU-IDR

| S/N | Subject spread in ABU-IDR | No of Document per subject | % of Subject Spread |
|-----|---------------------------|----------------------------|---------------------|
| 1 | Administration | 1182 | 11.99 |
| 2 | Agriculture | 903 | 9.16 |
| 3 | Arts | 574 | 5.82 |
| 4 | Education | 1702 | 17.27 |
| 5 | Engineering | 727 | 7.38 |
| 6 | Environmental design | 971 | 9.85 |
| 7 | Law | 305 | 3.09 |
| 8 | Medicine | 339 | 3.44 |
| 9 | Pharmaceutical sciences | 327 | 3.32 |
| 10 | Science | 1979 | 20.08 |
| 11 | Social sciences | 518 | 5.25 |
| 12 | Veterinary Medicine | 330 | 3.35 |
| | Total | 9, 857 | 100.00 |

FIG. 2: SUBJECTS SPREAD OF ABU-IDR



Looking at the findings of the study as reflected in the above table and figure, it is clear that the faculty of sciences has the largest contribution of 1979 (20.1%). This was followed by education with 1702 (17.3%). This finding is not unexpected because the two faculties are among the oldest and largest in the university. Apart from producing masters and PhD theses and dissertations, the faculties also produce projects under professional masters and postgraduate diplomas which are captured by the IDR. It is not surprising that faculties of Law 305 (3.09%), Medicine 339 (3.44%), Pharmaceutical Science 327 (3.32%) and Veterinary Medicine 330 (3.35%) recorded the lowest contributions respectively. The reasons for this may not be unconnected to the faculties running single degree programme and low enrollment into the postgraduate programme.

The last objective of the study investigated the challenges affecting the growth and development of ABU-IDR. Many literatures reviewed consented to the fact that globally IR are faced with myriads of challenges with slow down its growth and development. Therefore, to achieve this objective the staffs of ABU-IDR were interviewed and table 5.5 below shows their responses.

Table 5.5: Challenges affecting the growth and development of ABU-IDR

| S/N | Challenges affecting the growth and development of IR | Applicable |
|-----|---|------------|
| 1 | Epileptic power supply | Yes |
| 2 | Low deposition mandate among academics | Yes |
| 3 | Poor funding for repositories | Yes |
| 4 | Poor internet connectivity | Yes |
| 5 | Inadequate advocacy about the institutional repository | Yes |
| 6 | Copyright and intellectual property right | Yes |
| 7 | Poor infrastructure/equipment | Yes |
| 8 | Absence of institutional policies on institutional repository | Yes |
| 9 | Lack of adequate training and retraining of staff | Yes |
| 10 | Lack of data security and preservation strategies | Yes |
| 11 | Plagiarism and privacy issues | Yes |

The findings of this study as reflected in table 5.5 above look disturbingly alarming because ABU-IDR is faced with all the challenges enumerated in most literature reviewed. However, the most pressing challenges that are affecting the growth and development of ABU-IDR are the absence of institutional policies; low deposition, inadequate advocacy and copyright. The least reported challenges were poor infrastructure/equipment and lack of data security and preservation strategies. This finding is supported by Ivwighreghweta (2012) who reported similar challenges affecting the growth and development of institutional repositories studied.

6.0 Conclusion

Based on the findings of this study, it can be concluded that ABU-IDR has gained considerable traction in recent years. It creates new ways of self-archiving and open access outlets. With diverse features and deploying DSpace and OAI-PMH, the IDR captured myriad of documents that make the system to be interoperable. However, ABU-IDR can be made more effective and efficient by creating institutional repository policy that will take care of copyright, deposition right, diversification of contents and advocacy which are the major challenges hampering the growth and development of the IDR.

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